

IN THE CLAIMS:

Please amend the claims as follows:

1. (Currently Amended) A method of operating a filesystem, said filesystem including a live filesystem accessible to users and a zombie filesystem not accessible to users, said method including

moving at least some blocks of a file from said live filesystem to said zombie filesystem; and

recording changes to said zombie filesystem in a persistent memory.

2. (Currently Amended) A method ~~as in claim 1,~~ of operating a filesystem, said filesystem including a live filesystem accessible to users and a zombie filesystem not accessible to users, said method including

recording changes to said zombie filesystem in a persistent memory; and [[,]]

for a deletion operation on a file in said live filesystem; [[,]]

transferring said file from said live filesystem to said zombie filesystem;

breaking links associating disk blocks with said file in a plurality of steps while said file is associated with said zombie filesystem, wherein said recording of changes includes recording said breaking of links in a plurality of steps; and

altering said live filesystem to reflect said deletion operation.

3. (Currently Amended) A method ~~as in claim 1~~, of operating a filesystem, said filesystem including a live filesystem accessible to users and a zombie filesystem not accessible to users, said method including

recording changes to said zombie filesystem in a persistent memory; and [[,]]

for a truncation operation on a file in said live filesystem; [[,]]

transferring at least a portion of said file from said live filesystem to said zombie filesystem;

breaking links associating disk blocks with said file in a plurality of steps while a portion of said file is associated with said zombie filesystem, wherein said recording of changes includes recording said breaking of links in a plurality of steps; and

altering said live filesystem to reflect changes associated with said breaking of links.

4. (Currently Amended) A method ~~as in claim 1~~, of operating a filesystem, said filesystem including a live filesystem accessible to users and a zombie filesystem not accessible to users, said method including

recording changes to said zombie filesystem in a persistent memory; and [[,]]

for an operation apparent to users as substantially atomic, performing said operation in a plurality of steps using said zombie filesystem, wherein said recording changes is performed in said persistent memory for each of said plurality of steps.

5. (Currently Amended) A method ~~as in claim 1~~, of operating a filesystem, said filesystem including a live filesystem accessible to users and a zombie filesystem not accessible to users, said method including

recording changes to said zombie filesystem in a persistent memory; and [[,]]

for an operation performed on a file having attached data elements, performing said operation using said zombie file-space.

6. (Currently Amended) A method ~~as in claim 1~~, of operating a filesystem, said filesystem including a live filesystem accessible to users and a zombie filesystem not accessible to users, said method including

recording changes to said zombie filesystem in a persistent memory; and [[,]]

for an operation performed using said zombie filesystem, altering a size of said zombie filesystem during performance of said operation.

7. (Original) A method as in claim 1, including, for an operation performed using said zombie filesystem, checkpointing said filesystem during performance of said operation.

8. (Original) A method as in claim 1, including recording changes to said live filesystem in said persistent memory, wherein records of changes to said live filesystem and of changes to said zombie filesystem are substantially interspersed.

9. (Original) A method as in claim 1, including replaying a set of said changes in response to said record.
10. (Original) A method as in claim 1, including replaying a set of said changes to said live filesystem and to said zombie filesystem, wherein replay of changes includes substantial interspersed performance of changes to said live filesystem and to said zombie filesystem.
11. (Original) A method as in claim 1, including replaying a set of said changes in said record in response to a crash recovery by said filesystem.
12. (Original) A method as in claim 1, wherein said persistent memory includes a log of substantially all changes, within a selected time duration, to either said live filesystem or said zombie filesystem.
13. (Original) A method as in claim 1, wherein said persistent memory includes a log of substantially all changes, within a selected time duration, to said zombie filesystem.
14. (Original) A method as in claim 1, wherein said recorded changes include a set of substantially atomic operations to said zombie filesystem.

15. (Currently Amended) A method of operating a filesystem, said filesystem including a live filesystem accessible to users and a zombie filesystem not accessible to users, said method including

moving at least some blocks of a file from said live filesystem to said zombie filesystem; and

dynamically growing said zombie filesystem.

16. (Currently Amended) A method ~~as in claim 1, of operating a filesystem, said filesystem including a live filesystem accessible to users and a zombie filesystem not accessible to users, said method~~ including

recording changes to said zombie filesystem in a persistent memory; and [[,]]

for a deletion or truncation operation on a file in said live filesystem; [[,]]

allocating storage within said zombie filesystem for metadata associated with said file;

performing said dynamic growth in response to failure of said allocation of storage;

re-performing said allocation of storage after said dynamic growth; and

transferring said file from said live filesystem to said zombie filesystem.

17. (Original) A method as in claim 15, wherein said dynamic growth occurs, for an operation performed using said zombie filesystem; during performance of said operation.

18. (Currently Amended) A method of operating a filesystem, said filesystem including a live filesystem accessible to users and a zombie filesystem not accessible to users, said method including

transfer of a file from said live filesystem to said zombie filesystem before breakage of links to blocks in said file, in response to an operation on said file, said operation using said zombie filesystem.

19. (Currently Amended) A method ~~as in claim 18,~~ of operating a filesystem, said filesystem including a live filesystem accessible to users and a zombie filesystem not accessible to users, said method including

transfer of a file to said zombie filesystem before breakage of links to blocks in said file, in response to an operation on said file, said operation using said zombie filesystem;

wherein, for a deletion operation on a file in said live filesystem, said transfer includes

creating a link associating said file with said zombie filesystem; and

breaking a link associating said file with said live filesystem;

and said deletion operation includes

breaking links associating disk blocks with said file in a plurality of steps while said file is associated with said zombie filesystem;

recording said breaking of links in a plurality of steps; and

altering said live filesystem to reflect said deletion operation.

20. (Currently Amended) A method ~~as in claim 18~~, of operating a filesystem, said filesystem including a live filesystem accessible to users and a zombie filesystem not accessible to users, said method including

transfer of a file to said zombie filesystem before breakage of links to blocks in said file, in response to an operation on said file, said operation using said zombie filesystem;

wherein, for a truncation operation on a file in said live filesystem, said transfer includes

creating a link associating at least a portion of said file with said zombie filesystem;

and

breaking a link associating said portion with said file in said live filesystem;

and said truncation operation includes

breaking links associating disk blocks with said file in a plurality of steps while a portion of said file is associated with said zombie filesystem, wherein said recording of changes includes recording said breaking of links in a plurality of steps; and

altering said live filesystem to reflect changes associated with said breaking of links.

21. (Currently Amended) A method of operating a filesystem, said filesystem including a live filesystem accessible to users and a zombie filesystem not accessible to users, said method including

transfer of a file from said live filesystem to said zombie filesystem before performing any substantial portion of an operation on said file, said operation using said zombie filesystem.

22. (Currently Amended) A method ~~as in claim 21,~~ of operating a filesystem, said filesystem including a live filesystem accessible to users and a zombie filesystem not accessible to users, said method including

transfer of a file to said zombie filesystem before performing any substantial portion of an operation on said file, said operation using said zombie filesystem;

wherein, for a deletion operation on a file in said live filesystem, said transfer includes

creating a link associating said file with said zombie filesystem; and

breaking a link associating said file with said live filesystem;

and said deletion operation includes

breaking links associating disk blocks with said file in a plurality of steps only while said file is associated with said zombie filesystem;

recording said breaking of links in a plurality of steps; and

altering said live filesystem to reflect said deletion operation.



23. (Currently Amended) A method ~~as in claim 21~~, of operating a filesystem, said filesystem including a live filesystem accessible to users and a zombie filesystem not accessible to users, said method including

transfer of a file to said zombie filesystem before performing any substantial portion of an operation on said file, said operation using said zombie filesystem;

wherein, for a truncation operation on a file in said live filesystem, said transfer includes

creating a link associating at least a portion of said file with said zombie filesystem;

and

breaking a link associating said portion with said file in said live filesystem;

and said truncation operation includes

breaking links associating disk blocks with said file in a plurality of steps only while a portion of said file is associated with said zombie filesystem;

recording said breaking of links in a plurality of steps; and

altering said live filesystem to reflect changes associated with said breaking of links.

24. (Currently Amended) A method of operating a filesystem, said filesystem including a live filesystem accessible to users and a zombie filesystem not accessible to users, said method including

moving at least some blocks of a file from said live filesystem to said zombie filesystem; and  
replay of an operation on said [[a]] file, said operation using said zombie filesystem.

25. (Currently Amended) A method ~~as in claim 24~~, of operating a filesystem, said filesystem including a live filesystem accessible to users and a zombie filesystem not accessible to users, said method including

replay of an operation on a file, said operation using said zombie filesystem;  
wherein said replay is responsive to a set of recorded changes in a persistent memory;

and including, for a deletion operation on a file in said live filesystem,  
transferring said file from said live filesystem to said zombie filesystem, and  
recording said transfer in said persistent memory;

breaking links associating disk blocks with said file in a plurality of steps while said file is associated with said zombie filesystem, and recording said breaking of links in said persistent memory in a plurality of steps; and

altering said live filesystem to reflect said deletion operation, and recording said alteration in said persistent memory.

26. (Currently Amended) A method ~~as in claim 24~~, of operating a filesystem, said filesystem including a live filesystem accessible to users and a zombie filesystem not accessible to users, said method including

replay of an operation on a file, said operation using said zombie filesystem;

wherein said replay is responsive to a set of recorded changes in a persistent memory;

and including, for a truncation operation on a file in said live filesystem,

transferring at least a portion of said file from said live filesystem to said zombie filesystem, and recording said transfer in said persistent memory;

breaking links associating disk blocks with said file in a plurality of steps while a portion of said file is associated with said zombie filesystem, and recording said breaking of links in said persistent memory in a plurality of steps; and

altering said live filesystem to reflect changes associated with said breaking of links, and recording said alteration in said persistent memory.

27. (Currently Amended) A method of operating a filesystem, said filesystem including a live filesystem accessible to users and a zombie filesystem not accessible to users, said method including

moving at least some blocks of a file from said live filesystem to said zombie filesystem; and

replay of a set of filesystem operations, said operations including at least some operations using said live filesystem and at least some operations using said zombie filesystem.

28. (Currently Amended) A method ~~as in claim 27~~, of operating a filesystem, said filesystem including a live filesystem accessible to users and a zombie filesystem not accessible to users, said method including

replay of a set of filesystem operations, said operations including at least some operations using said live filesystem and at least some operations using said zombie filesystem;

wherein said replay is responsive to a set of recorded changes in a persistent memory;

and including, for a deletion operation on a file in said live filesystem, transferring said file from said live filesystem to said zombie filesystem, and recording said transfer in said persistent memory;

breaking links associating disk blocks with said file in a plurality of steps while said file is associated with said zombie filesystem, and recording said breaking of links in said persistent memory in a plurality of steps; and

altering said live filesystem to reflect said deletion operation, and recording said alteration in said persistent memory.

29. (Currently Amended) A method ~~as in claim 27~~, of operating a filesystem, said filesystem including a live filesystem accessible to users and a zombie filesystem not accessible to users, said method including

replay of a set of filesystem operations, said operations including at least some operations using said live filesystem and at least some operations using said zombie filesystem;

wherein said replay is responsive to a set of recorded changes in a persistent memory;

and including, for a truncation operation on a file in said live filesystem, transferring at least a portion of said file from said live filesystem to said zombie filesystem, and recording said transfer in said persistent memory;

breaking links associating disk blocks with said file in a plurality of steps while a portion of said file is associated with said zombie filesystem, and recording said breaking of links in said persistent memory in a plurality of steps; and

altering said live filesystem to reflect changes associated with said breaking of links, and recording said alteration in said persistent memory.